Environmental Interpretation and Education in Indiana

An Honors Thesis (HONR 499)

By

Kalee Snorden

Thesis Advisor

Dr. Alexander Kaufman

Ball State University

Muncie, IN

May 2019

Expected Date of Graduation

May 2020

Abstract

Environmental education and interpretation are vital to the success of conservation efforts and will only grow in increasing importance as urban environments grow and the average American's knowledge of nature decreases. This thesis will tell the story of environmental education and interpretation in Indiana through a thorough inquiry of the history of environmental interpretation and environmental education in both the United States and Indiana, followed by an analysis of the methods of environmental interpretation in Indiana including discussion on the similarities between accepted environmental interpretation and education practices. This story plays a role in the current practices of environmental education and interpretation in Indiana and will be key in the future of environmental interpretation and education. In the history of conservation and environmental interpretation in Indiana, there has been a trend of making public lands relevant and more accessible to all Hoosiers. Professional approaches in Indiana to environmental interpretation and education grew from the voluntary efforts of Hoosiers and it is the work of volunteers that will continue to forge the connection between the average Hoosier and nature as urban populations grow. In this effort to aid conservation and communicate to Hoosiers the value of nature, environmental interpretation and education is key to an environmentally literate and sustainable Indiana.

Acknowledgments

I would like to thank my parents for introducing me to nature at a young age, specifically my father who shared his love of nature with me. I thank my twin sister who was my partner in both watching Animal Planet and exploring the outdoors throughout our childhood and supported me in the writing of this thesis. Thank you to my thesis advisor Dr. Kaufman, my peers in HONR 499 who edited this document, and the Department of Biology at Ball State which has worked to educate and engage me throughout my academic career. A special thanks goes to María del Castillo from Aves Argentinas in Buenos Aires, Argentina for mentoring me and introducing me to the topic of environmental interpretation and education, which sparked the subject pursued in this paper.

Table of Contents

Process Analysis Statement

When I began planning my thesis, I was certain I would focus on the history of environmental interpretation and education with the understanding that the history of it would play a smaller role in my overall thesis. I planned on my thesis briefly relating to the historical connections of the forefathers of environmental interpretation and education, the National Parks Service (NPS) and State Parks but relating more to the present-day practices of NPS and Indiana State Parks and their interrelatedness. I also believed, prior to any research, that the connections between environmental interpretation and education within the National Park Service and state-run Departments of Natural Resources would be rather linear and straightforward. I was naïve to think this. Because of this development, my outline morphed as I wrote my paper and researched my topic.

Before even drafting my outline, I compiled 90% of my sources so that I had a better idea as to what information I was working with. From there, I sorted my sources into the distinct sections of my paper: history and the methods of environmental interpretation and education. After that, I began to take notes on sources, beginning with the ones that supported the first section of my thesis. After I had a good amount of information to work with, I began to add this to my skeletal topic outline. As I did so, I continued to research specific facts and other information that strengthened the foundation of environmental interpretation in Indiana I was building. After outlining a decent amount, I wrote it — adding footnotes and pictures for the appendix as I went, so that story I was weaving together flowed mentally for me. By doing this, I was able to conceptualize the connections of this history to environmental interpretation and

education in Indiana in the present as well as see how its origins support my thesis statement that environmental education is crucial for Indiana as we continue into an even more urban future.

The second part of my thesis, where I planned to discuss environmental interpretation and education in Indiana and its approaches, is the portion that has changed the most. My original outline included the history of environmental interpretation and education in Indiana flowing cohesively and quickly from the history of the national level. Rather, it has not flowed as much, the two histories complement each other in principle- as for both Indiana and the United States conservation arose from urbanization and exploitation. Unlike my previous plan of history taking a somewhat minor role in my thesis, it has become a major section due to the importance of the history for setting up my main argument. Due to the dynamic interconnection between citizen science, literature, scientific research, and academia environmental interpretation, the second part of my thesis is an analysis of the methods of environmental interpretation and education in Indiana and the dynamics behind each of them.

The analysis of environmental interpretation and education in Indiana includes the relatedness between the practices of environmental interpretation and education to that on the National level. Originally, I was going to look at the specific connections between Indiana's environmental interpretation and education efforts to that of the National Park Service, but now I realize these specific connections do not exist. Where there are connections between NPS and Indiana State Parks, they are not black and white. There are no national guidelines for environmental interpretation, but there is a pattern of execution among the agencies. Due to the complexity of the relationship between national and state-level environmental interpretation, I looked at nature study as defined by Liberty-Hyde Bailey and its connection to environmental interpretation today in the National Parks Service (NPS) and in state parks. Then I defined

environmental interpretation and education, and more broadly (and briefly) address the connections between NPS and Indiana, followed by the discussion of current efforts of environmental interpretation and education in Indiana. Throughout these points, I incorporated support for my thesis statement that environmental interpretation and education will become more important for Indiana's sustainability as our population becomes more urban. The final thesis builds the main argument for environmental interpretation and education through the story of its history and discussion of the connections between prevailing philosophies of environmental education, environmental literacy and sustainability, as well as the practices of NPS and Indiana.

The History and Application of Environmental Interpretation and Education in Indiana

Introduction

The momentum of environmental interpretation and education in Indiana is moving towards becoming an integral part of a sustainable society of Hoosiers — part of the movement for a sustainable America. Between 2000 and 2015, according to information from the United States Census Bureau and the Pew Research Center, the Midwest has had the largest drop in rural populations and the largest increase in small metro or suburban populations (Parker, Horowitz, Brown, Fry, Cohn and Igielnik, 2018). In contrast to the growth of suburban and urban communities in the Mid-West, there is a notable majority of rural counties in the region. However, since 2000, 68% of rural counties have lost population and 85% of rural midwestern counties have lost more population than has moved in (Parker et al., 2018). In Indiana, our urban populations have increased from 70.8% of Indiana's total population in 2000 to 72.4% in 2010 (Iowa Community Indicators Program, 2019). This means the urban areas of the Midwest, including Indiana, are becoming more concentrated as new urban residents move in and the traditional rural majority is diminishing. This is causing the average time spent in nature and overall contact with wilderness to decrease among American citizens, notably Hoosiers —— a phenomenon that is furthered by the advent of technological pastimes.

A decrease in time spent outdoors, in contact with nature, directly effects our capacity to be aware of nature and be motivated to protect it by actively participating in conservation efforts or sustainable living practices. These actions are translated into environmental literacy.

Environmental literacy is understanding the larger role we play in the ecosystem and our stewardship of the earth through conscious, sustainable living, is necessary for a healthy, robust future for Indiana. To foster a sustainable Indiana, environmental education and interpretation are key. In one of the most widely used and accepted definitions of environmental education and interpretation states that "environmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution" (Stapp et al., 1969). This objective mirrors the aim of environmental interpretation, which is to create a bridge between people and natural resources by enhancing awareness and appreciation of nature and encouraging the development of positive personal connection with nature (Indiana Department of Natural Resources, 2003).

Environmental interpretation and education are the vehicle to promoting this environmental literacy among Hoosiers. The past and present efforts of conservation and education on the part of individual parties and state employees has built a legacy of momentum towards sustainability for Indiana. This momentum, while not always observable to the public eye, must continue to integrate itself into the larger, more urban populations of Hoosiers that lack the exposure to nature that has, in the past, fostered the involvement of communities in conservation and sustainable living. Understanding Indiana's conservation and environmental interpretation efforts will provide the context for which deeper discussions on the execution of environmental interpretation and education can be had. In this thesis, I will discuss the history of environmental interpretation in both the United States and in Indiana, which will be followed by the brief analysis of environmental interpretation and education and its execution in our state.

Environmental education and interpretation are vital to the success of conservation efforts and will only grow in increasing importance as urban environments grow and the average American's connection with nature decreases.

The History of Environmental Interpretation from Europe to the United States

The formation of the concept of environmental interpretation and education coincides with the Industrial Revolution in Europe, which caused urban populations to increase and squalor urban environments and pollution became an issue. The origins of environmental interpretation were inspired by the work of Rousseau (1712-1778), a philosopher, writer, political-theorist, and ardent educationist,[1] who advocated for the reconnection of youth with nature for the betterment of society through education (Martin, 1975). Cultivating Rousseau's ideas, Patrick Geddes (1854-1932), a Scottish sociologist and biologist, and Frederic Le Play (1806-1882), a French sociologist, focused on the intertwining of Europe's environmental concerns of pollution and squalor with the education of the public (Higgs, 1890; Martin, 1975; Patrick Geddes, 2018). Rousseau, Le Play, and Geddes saw a connection to the improvement of the environment with the education and engagement of youth with nature. These philosophies laid the foundation of further environmental educative and interpretative efforts in Europe. These strains of thought also influenced the development of environmental interpretation through the conservationist movement in the United States. Like the work of Rousseau, early environmental interpretation movements focused on reconnecting the child and nature with the overall aim of an ecologically aware, conservation-focused society in the midst of an increased urban presence.

[1] An educationist is a person who advocates for the education of the public on certain issues.

Much like the emergence of environmental interpretation in Europe, the stage was set for natural interpretation to blossom due to the ending of the myth of the frontier and rampant exploitation of natural resources by Americans.[2] As a result of the conservationist movement in the US, ecological tourism became popular, which culminated into the American Grand Tour, and focused on the exploration of all the national parks in a journey to explore the continental United States.[3] This feat of eco-tourism was heavily marked by environmental and historical interpretation to enhance the experience by expanding the understanding of the individual (Brunelli, 2013). While the exploitation of natural resources fueled the public movement towards conservation, this paralleled the work of early conservationist, scientists, and educators to establish federally protected lands and promote an ecological conscience among Americans. John Muir, Enos Mills, and Liberty Hyde Bailey are three prominent forefathers of the environmental interpretative and educational movements in the United States.

John Muir (1838-1914) was a scientist who conducted studies in the Californian Yosemite Valley, in what would become the Yosemite National Park, and became a promoter of the conservationist movement. He garnered support among the public by leading guests on hikes where he interpreted the natural world around them, which he recorded in journals he published for further public engagement in the wonders of nature (Wolf, 1945). From his journals, Muir coined the word "interpret" in reference to nature: "As long as I live, I'll hear waterfalls and birds and winds sing. I'll *interpret* [emphasis mine] the rocks, learn the language of flood, storm, and the avalanche (Muir, 1996)." This use of the word "interpret" in reference to the natural

[2] See Appendix A to further understand the extent of resource exploitation by Americans in the 1800s.

surroundings formed the basis of the current definition and role of interpretation used by the National Park Service, and subsequently, the state and private levels of environmental efforts (Mackintosh, 1986). Later in his career, Muir devoted his efforts fully to the cause of conservation and was a prominent advocate for national parks and refuges even before Yellowstone was founded in 1872 (Wolf, 1945). In 1901, his book *National Parks* played a large part in garnering the public support for national parks and other federally protected lands (Wolf, 1945).

Beyond his role in promoting public awareness on the purpose and benefits of federally protected lands, he promoted the need of national parks to United States Government. A 1903 guided outing with President Theodore Roosevelt played a role in the forming President's strong conviction towards conservation through the creation of federal lands (Wolf, 1945). It was this outing in Yosemite with Muir that convinced Roosevelt to push for the founding of the Yosemite National Park (Wolf, 1945). Muir's letters[3] to President Roosevelt aided in the creation of the proposals of the Yosemite and Sequoia National Park Bills to Congress as they aided the President to express the emotional connection to the land and description of its biological importance he did not have personally (Muir, 1996). In culmination of his achievement toward the promotion of conservation, Muir played an influential role in the founding of the Sierra Club in 1892, where he served as president until his death in 1914 (Wolf, 1945; Brunelli, 2013). In 1902, the Sierra Club began offering outings to members and educational hikes in national parks to the public, many of which Muir led (Wolf, 1945).

Coming alongside John Muir's conservation and interpretative efforts was Liberty-Hyde

[3] To read Muir's letters to President Theodore Roosevelt, view them in the archives of the state of California: http://content.cdlib.org/ark:/13030/kt0x0nd9tp/?order=2

Bailey (1858-1954), the American counterpart for the Nature Study Movement, which began in England and was adopted in the United States (Brunelli, 2013). Nature Study began to take form in the United States between 1884 and 1890, corresponding with the American Education Reform Movement in the late 1800s, and originated from a movement called "object study" in primary schools where children learned to observe an object and explore it through inquiry to acquire knowledge (Bailey, 1920). In his book *The Nature Study Idea*, Bailey stresses the informality of Nature Study and defines it as "the direct observation to form knowledge and love of the common things and the environment by a child (Bailey, 1920)." Nature Study did not become established in the American Education System as Bailey advocated, but it did leave the foundation for future environmental study-based programs. Later environmental studies in schools, however, are more rooted in natural sciences rather than the focused, informal exploration of nature in primary schools as advocated by Bailey.

Both John Muir and Liberty-Hyde Bailey advocated for the exposure of Americans to nature, but it was Enos Mills (1870-1922) , who has been termed the "Father of Environmental Interpretation," who ushered in professional natural interpretation in the United States — which trickled down into the beginnings of organized environmental interpretation in Indiana (Brunelli, 2013). Throughout his lifetime, Enos Mills was a known writer of personal narrative of his trips and hikes in the mountains of the Americas and was a popular lecturer in the United States (Brunelli, 2013). While his roles as an author and lecturer made him popular as a speaker, he focused much of his energy on educating youth and adults on nature. Enos Mills opened Long's

Peak Inn[4] on a family ranch in 1901 (Mackintosh, 1986; Brunelli, 2013). A key feature of his Inn was a year-round "Trail School" with the main goal of learning of and from nature to occur through exploration. Enos Mills was the first to define a nature guide, in his book *Adventures of a Nature Guide*, as "a naturalist [or guide interpreter] who can guide others to the secrets of nature," who works to convey big principles rather than isolated information, offers recreation rather than dull facts, and evokes "intellectual visions" without rules or manuals (Mills, 1920; see also Brunelli, 2013). Later in his career as a guide interpreter, Enos opened his Trail School to training naturalists with the hope to spread "trail schools" across the country. In his book, Enos comments that "A trail school may be had anywhere. … The chief means of interesting children in nature is to expose them — bring them in contact with outdoor things (Mills, 1920)." After 14 years of operation, the land of Long's Peak Inn and the surrounding areas became a part of the Rocky Mountain National Park in 1915 (Brunelli, 2013).

In the case of Rocky Mountain National Park, the Park began with the practice of natural interpretation in its heritage, leading to the licensing of young women as nature guides there in 1917 (Mackintosh, 1986). But with the other national parks, natural interpretation took longer to become established. Education and interpretation are one of the six core objectives of the National Park Service,[5] and it is recognized that parks possess an ability to awaken a conservation ethic in their visitors (McClelland, 2002). The efforts of environmentally focused education began in Yellowstone National Park (founded in 1872) in 1886 when the US Army

[4] See Appendix A to see an image of Long's Peak Inn. See also https://estespark.pastperfectonline.com/bysearchterm?keyword=Longs+Peak+Inn&page=1 to view a digital history of Long's Peak Inn.

[5] The six objectives of the National Parks Service are resource stewardship and protection, access and employment, education and interpretation, proactive leadership, science and research, and professionalism.

Corps began "cone talks" to educate visitors on the thermal vents where they were stationed (Mackintosh, 1986; see also McClelland, 2002). In the early 1900s, the Wylie Camping Company hired teachers to lecture on natural phenomena at camping sites. Until the mid-1900s, the focus on environmental interpretation and education on National Parks was literary, with the 1913 publication of Lauren F. Scheckbier's booklets on *The Secret of the Big Trees: Yosemite, Sequoia, and Grant National Parks*[6], Robert S Yard's *The National Parks Portfolio*[7], and the inaugural 1916 National Park Service's publication of *Glimpses of our National Parks*[8] (Mackintosh, 1986). Due to lack of support within Congress for environmental educational endeavors of the National Parks Service, early internal efforts of education were through third party organizations such as the National Parks Educational Committee, which coalesced into the National Parks Association, and the Sierra Club who offered education talks inside parks (Mackintosh, 1986; McClelland, 2002).

On-site interpretation funded and directed by the National Parks Service (NPS) began in 1920 and was officially established with the creation of the NPS Education Division in 1923 (Mackintosh, 1986). In 1920, the Yosemite Free Nature Guide program was launched, offering educational programs lead by NPS staff, which lead to the naming of the first official Park Naturalist, Ranger Milton P. Skinner (Mackintosh, 1986). In 1925, Yosemite opened the School of Natural History to train naturalists. Despite these efforts, environmental interpretation was not widespread or focused throughout the National Parks. However, NPS interpretative endeavors

---

[6] To access *The Secret of the Big trees: Yosemite, Sequoia, and Grant National Parks*, visit https://archive.org/details/cu31924001688591/page/n1 .
[7] To access *National Parks Portfolio* visit http://npshistory.com/publications/npportfolio/1925.pdf .
[8] To access *Glimpses of Our National Parks* visit https://archive.org/details/glimpsesofournat00unit/page/n4 .

were focused on the more historical and heritage side of the parks, as "trailside" museums[9] were focused on these aims (Mackintosh, 1986). From 1956 to 1966, the project Mission 66[10] was launched as a ten-year program to improve national park facilities and promote stewardship in commemoration of the National Park Service's 50th anniversary (Mackintosh, 1986). From this program came the adoption of visitor centers, which are — as defined by the Mission 66 Prospectus — to serve as "the hub of the park interpretative program… [where] trained personnel help ... visitors understand the meaning of the park and its features, and how to best protect, use, and appreciate them (Mackintosh, 1986)." Before Mission 66, only 33 visitor centers existed in the National Parks. By 1975, there where over 281 visitor centers in national parks and monuments nationwide (Mackintosh, 1986).

Another integral part of fostering stewardship in national parks as part of Mission 66 was the NEED (National Environmental Education Development) program to develop environmental awareness both in parks and in schools nationwide (Mackintosh, 1986). [11] In line with the National Parks Service's initiative to standardize environmental interpretation was their publication of the magazine *In Touch: Interpreters Info Exchange* in April 1974, which died off in 1975 and was revived in 1986. The objective of the magazine was to discuss interpretation advice and inspiration on the technicalities and to discuss prevailing environmental interpretative ideas (Mackintosh, 1986). These outreach efforts and the redirection of environmental policy of the United States Government, including the Environmental Education Act of 1970 and the

[9] Trailside museums in National Parks were precursors to visitor or nature centers.
[10] To learn more about Mission 66, visit http://npshistory.com/centennial/0516/index.htm .
[11] NPS's National Environmental Educational Development program provided materials for teachers and formed dedicated Environmental Study Areas in National Parks for the outdoor exploration of nature by local schoolchildren.

National Environmental Education Act of 1990, aided in the establishment of environmental interpretative efforts in states (Martin 1970). The Environmental Education Act of 1970, which expired in 1976, and the National Environmental Education Act of 1990, which expired in 1996,[12] both appropriated funds to an Office of Environmental Education for grants for environmentally-focused curricula, teacher-training programs, other environmentally focused projects (Sullivan and Schelsinger, 1972; Environmental Protection Agency, 1990). Unfortunately, these bills where short lived and played a minute role in the establishment of environmental interpretation or education in Indiana.

The History of Environmental Interpretation in Indiana

Like the development of environmental interpretation on a national scale, the first efforts on the part of individuals to promote an ecological conscience in Indiana came as a result of rampant land and resource exploitation that aligned with progressing urbanization. The arrival of settlers, the growth of agriculture, and the establishment of cities and towns in Indiana spurred increased resource use and exploitation by residents. Early conservation movements and the environmental education and interpretation efforts were an attempt to address the problem of unsustainable resource-use, and current conservation efforts are focused on the same battle for sustainability among Hoosiers in rural and urban environments.

[12] Both the National Environmental Education Act of 1970 and the National Environmental Education Act of 1990 were initially appropriated funds by Congress, but where not appropriated the substantial funds that would have enabled the acts to make an impact in the environmental education in Indiana. Additionally, these Acts were set to be reviewed after six years of their passing. Neither bill was reviewed, causing the bills to expire or become inactive.

By the end of the nineteenth century, Indiana had lost the Carolina parakeet and the passenger pigeon as a result of over-harvesting by settlers.[13] In an 1810 report of the northwest territories given to congress by General P.B. Porter in 1810, 50% of the land that became Indiana was covered by water for at least six months out of the year (Jackson, 1997). By the early twentieth century, less than 4 percent of the original wetlands in Indiana remained due to the draining of land for agriculture (Indiana Department of Environmental Management, 2019a).[14] By the time of the Great Depression in the 1930s, the natural resources in Indiana were on their last leg due to record high temperatures and lengthy droughts. All original forest found in Indiana when settlers arrived was gone and healthy second growth forest stands were consumed for firewood and fuel. During the late 1800s and early 1900s, deforestation for agricultural repurposing caused Indiana's 23 million acres of forest to less than two million acres (Indiana Department of Natural Resources, 2019b). Hunting regulations were ignored, and agriculture had caused major erosion, stream siltation, and flooding problems due to wetland drainage — a problem that continued to grow and by the 1920s two-thirds of Indiana's lands were engaged in agricultural production.

This bottoming-out point of Indiana's natural resources, where the agricultural output and economy were severely affected, signaled a turning point in conservation efforts in Indiana. The results of existing conservation and interpretative beginnings laid the foundation upon which modern efforts are based. Natural interpretation in Indiana began with scientists working to

---

[13]The Carolina parakeet (*Conuropsis carolinensis)* and the passenger pigeon (*Ectopistes migratorius*) are bird species that were native to Indiana and are now extinct due to market and recreational hunting.

[14] Wetlands provide important habitat for species and serve as ecological filters, slowly filtering impurities out of the groundwater and absorbing excess water in watersheds. Once wetlands are drained, flooding becomes a prominent issue in the surrounding area. For more information on Indiana's current protected wetlands visit https://www.in.gov/dnr/naturepreserve/7384.htm

understand and catalogue native wildlife. General George Rogers Park has been considered the first known man of science in Indiana starting in 1778 and was sought out by John James Audubon as an authority on the birds of the West (Jackson, 1997). Most of the pre-1800s records of Indiana's natural features comes from a federal survey mandated by President Thomas Jefferson by the General Land Office of Indiana (the name then given to the land acquired by the Louisiana Purchase) begun in 1799 and finished in 1835.[15] This catalogued Indiana's soils, forest, prairies, lakes, streams, marshes, and more (Jackson, 1997). General P.B. Porter's survey of the water routes of the Northwest territory in 1810 added to the wealth of information about Indiana's natural features generated in the 1800s. The work of David Dale Owen, the founder of the United States Geological Survey, was inspired by the limestone in Wabash, Indiana and catalogued the geological history of Indiana's limestone (Jackson, 1997). Coming on to the scene later than either Park, Porter, or Owen was Willis S. Blatchley, who wrote several scientific reports beginning in 1894 which composes the basis of our knowledge on insects and other fauna of the early 1900s in Indiana (Jackson, 1997).

Throughout the early history of Indiana, sportsmen's clubs, which are groups of hunters and anglers, were the epicenter for conservation or preservation advances because they were in tune with native wildlife and their habitats.[16] For example, several of the U.S. presidents who,

[15] President Thomas Jefferson mandated this survey to explore the natural resources and Native American populations in the land acquired from the Louisiana Purchase, which included what is now the state of Indiana.

[16] Sportsman are people who engage in hunting or fishing. Sportsmen's clubs allow for the organization of hunters and anglers to socialize and serve as a rallying point for local and nationwide conservation. The 1887 establishment of the Boone and Crockett Club by President Theodore Roosevelt began the history of sportsmen and conservation (Dray, 2018). Other sportsmen's clubs include Pheasants Forever and Quail Unlimited (Sparling, 2014).

such as President Theodore Roosevelt and Indiana-native President Benjamin Harrison,[17] were advocates for conservation in policy belonged to sportsmen clubs.[18] As time went on, interest in science increased in Indiana, culminating in the 1885 establishment of the Indiana Academy of Science which not only functions to connect science educators, students, and scientists, but also plays a large role in supporting conservation endeavors and wildlife research (DNR, 2019; Jackson, 1997). Coinciding with the rise of a scientific community in Indiana, changes in the quantity of game and the quality of their habitat did not go unnoticed. Monitoring of game began in the Civil War era and became official in 1881 when the state office of the commissioner of fisheries was established, which later coalesced into the 1889 establishment of the Department of Fisheries and Game (Indiana DNR, 2019b; see also Jackson, 1997). Following this, the monitoring of game habitat and land use took a more focused role when the Indiana legislature created the Board of Forestry and the role of State Forester (Indiana DNR, 2019b).

Foreshadowed by the establishment of the commissioner of fisheries, the state department charged with overseeing all of Indiana's conservation efforts- the Department of Conservation (DOC) — was established March of 1919. The DOC consisted of 5 divisions: the division of geology, the division of entomology, the division of forestry, the division of lands and waters, and the division of fish and game (Indiana DNR, 2019b). The establishment of the Department of

[17] Between 1891-92, President Benjamin Harrison established 15 forested areas, totaling 13 million acres, to become federal lands which eventually became a part of the United States Forest Service. (p. 43 Sparling, 2014)

[18] President Theodore Roosevelt, the first president of the Boone and Crockett Club, set the definition of a 'true sportsmen' as one who hunts for the pursuit of the game, inflicts no unnecessary pain or suffering on the game, gains nothing financially from the game, does not waste the game killed, affords fair chase, and seeks the knowledge of nature and the habitats of animals (Dray, 2018).

Conservation (later changed to the Department of Natural Resources in 1965)[19] allowed conservation to take a more official stance within the state government, with Colonel Richard Lieber as the first director. Under Lieber's lead, the DOC focused on the acquisition and creation of state parks and worked to collaborate with Indiana residents for conserving Indiana's resources and creating usable spaces for Hoosiers to enjoy nature recreationally (Indiana DNR, 2019b; see also Jackson 1997). In 1921, the Indiana Classified Forest Act allowed hundreds of thousands of private forestlands to be voluntarily conserved by the land owners in collaboration with the DOC in exchange for a property tax deduction (Indiana DNR, 2019b; Jackson, 1997). The Indiana Classified Forest Act served as a precursor to the 1950 Cooperative Forest Management Act that further enhanced the cooperation of private lands owners and the DOC to ensure recommended forestry practices are used on enrolled land and freed-up federal funds to do this. Later, a similar program was created for non-forested wildlife habitat on private land (Indiana DNR, 2019b; Jackson, 1997). In 1927, Indiana's DOC took a more proactive approach to accommodating the needs of the public at state parks by implementing a naturalist program at Dunes, Turkey Run, Clifty Falls, and McCormick's Creek. This program later spread to many of Indiana's state parks and coincided with a larger focus on camping at State Parks which was spurred on by the increase in Hoosiers who lived and worked in urban environments in the 1900s (Indiana DNR, 2019b).

The desire by the public for a naturalist program in Indiana's state parks grew from the independent work of environmental interpretation and education done by passionate individuals. Before the creation of state naturalists, the main source of natural interpretation in Indiana was

[19] To learn more about the history of Indiana's Department of Natural Resources visit: https://www.in.gov/dnr/3245.htm

the result of work done by free-lance writers, artists, scientists, and other nature advocates who played an important role in exposing the residents of Indiana to their natural heritage in a positive light. Among the first, Gene Stratton-Porter (1887 – 1924) was a self-made artist and literary naturalist who wrote twenty-one books,[20] all of which were based on her time in a small area in northeast Indiana and gained worldwide attention (Jackson, 1997). Her books were published in eight languages and captured the essence of swamplands, one was a book on the moths she studied in Limberlost swamp before it was drained. Due to the tragic fate of the Limberlost, Gene Stratton-Porter worked to preserve the swampland near her home by Sylvan Lake near Rome City, Indiana.[21] In her efforts, she hired a five-person crew to transplant and preserve wildflowers — a work that can still be seen as eight of the original 150 acres of the swamp and wildflowers survives today (Jackson, 1997). Not only did Gene Stratton-Porter leave a legacy in her work towards preservation, her books combined with that of John Muir and the advocacy of President Theodore Roosevelt in the late nineteenth and early twentieth century to educate the country on the value of the wilderness, the ruthless exploitation of natural resources and land, and motivate the American public to action.

Further advancement of Indiana's pursuit of conservation on the part of individuals and newly created organizations followed the Great Depression, as Hoosiers recognized the economic importance of healthy natural resources. Rachel Carson's 1962 *Silent Spring* along with the publications of notable researchers of Indiana's wildlife fueled a burgeoning ecological conscience in Indiana (Sparling, 2014). A self-made writer, Edwin Way Teale wrote books on

[20] Gene Stratton-Porter's books gained attention for their romantic and somewhat transcendentalist take on nature. More information can be found on her books here: https://www.genestratton-porter.com/genes-works

[21] The site of Gene Stratton-Porter's home is now a state historic site. Learn more about it here: https://www.indianamuseum.org/gsp

the four seasons based on his travel cross country. His book *Dune Boy* is based on the time he spent as a child near the Indiana dunes. Edwin also created nearly 30,000 photo-negatives on insects, some of which from Indiana, and printed in more than 100 periodicals writing about nature (Jackson, 1997). Meanwhile, the work of President Franklin Delano Roosevelt's Civilian Conservation Corps (CCC) enhanced the accessibility of our state parks and forests by constructing many of the gatehouses, campsites, and nature centers[22] we still use today. In 1934, as the facilities at Indiana's state parks became more developed with the aid of the CCC, the Educational Bureau was established within the DOC, which served as a precursor to the current Division of Public Information and Education (Indiana DNR, 2019b). In 1934, the newly formed Educational Bureau published the first issue of the *Outdoor Indiana* magazine, which aims to inform Hoosiers of the happenings of Indiana's state parks, preserves, forests, along with other seasonal information (Indiana DNRb, 2019; see also Jackson, 1997).

In addition to the work being done by the CCC following the Great Depression, The Public Works Administration (PWA) also assisted in conservation in Indiana by assisting in archaeological excavations at Mounds, building and managing commercial fish hatcheries, and maintaining historical sites (The Living, 2019). While the CCC and PWA enhanced Indiana's significant public lands, Charles C. Deam (1865-1953), the most notorious of Indiana botanists, studied and cataloged the flora of Indiana throughout the 1900s— publishing *The Flora of Indiana* in 1940 and *Trees of Indiana* in 1953. *Trees of Indiana* is still being edited and republished today, serving as an authority for students and professionals on the flora of Indiana. Deam's publications also benefited Hoosiers beyond those of the academic and scientific variety

[22] The CCC constructed buildings and reforested areas of several state parks according to the National Park Service's guidelines for state parks. More information about the CCC in Indiana can be found here: https://livingnewdeal.org/indianas-first-ccc-museum/

(Jackson, 1997). In the first three years of the book's publishing, the state printed 10,000 free copies for residents (Kriebel, 1987). Additionally, Deam created forestry-related curriculum for Indiana schoolchildren during his time as the Secretary of the State Board of forestry in 1909 (DNR, 2019). On par with the work of Deam, scientist Winona H. Welch cataloged the mosses of Indiana in her book *Mosses of Indiana* and went on to become a world authority on moss and liverwort classification (Jackson, 1997).

Through the work of scientists such as Winona Welch and Charles Deam and those who spearheaded the Department of Conservation's efforts to preserve Indiana's natural heritage and make it available to the public, there grew a mutual cooperation among conservation-minded Hoosiers and the DOC. Before the 1960s, the acquisition of each state property was, as described by Marion Jackson, the author of *The Heritage of Indiana* (1997):

> the result of the dreams and actions of civic leaders with the support of enthusiastic citizens and cooperative legislature, which enacted the necessary statutes and made the appropriations. But it was the direct involvement of individuals, business groups, newspaper officials and schoolchildren that provided the momentum for the acquisition of public lands (p. 422).

Marion Jackson's description portrays the multi-faceted efforts that the purchase of lands for the state with the intention of conservation entails. In most cases, especially before the appropriation of funds for land purchasing, the process began with a handful of individuals from local communities raising awareness and promoting the cause. Then, a private organization — such as the Indiana Chapter of the Nature Conservancy — took interest and aided grassroots efforts to fundraise, thus reaching more corporations and businesses than the individuals could. Once the support needed for the purchase of the land was raised, the land was purchased and then donated

to the state for conservation. Following this, state legislature eventually enacted the necessary legislature to create a new state park, fish and wildlife area, or nature preserve. This effort, as described by Marion Jackson, was truly the work of individuals, business groups, newspaper officials, schoolchildren, and cooperative legislatures.

These grassroots movements toward conservation laid the foundations of environmental interpretative and educative efforts in Indiana's communities. For example, the creation of the Pine Hills Nature Preserve in Brown County is an example of this collaboration amongst public interest groups and the DOC (Department of Conservation). The idea to act for the preservation of the rolling hills and bluffs of Pine Hills was officially supported by the Indiana Academy of Science in 1953 and a committee was formed to popularize the idea. Later that year, the Indiana Chapter of the Nature Conservancy took an interest in the issue and undertook the acquisition of Pine Hills as their first project.[23] In 1960, the Nature Conservancy purchased Pine Hills and later donated it to the state in 1961 (Jackson, 1997). Before Pine Hills gained the official title and legal protections of a nature preserve, it was designated as a National Natural Landmark in 1968 due to the area's history (The Nature Conservancy, 2019). In 1969, the state granted it Nature Preserve status — making Pine Hills Indiana's first Nature Preserve (The Nature Conservancy, 2019). In 1970, Pine Hills Nature Preserve was completed with the donation of 35 acres in the northwest corner by Wabash College (Jackson, 1997). Another example of a more public-oriented approach to land conservation is the state acquisition of Cox Woods, which was the private property of the Coxes until the family sold the property to the Louisville lumber company

[23] The Nature Conservancy still lists Pine Hills in Paoli, IN as one of the sites they protect. See the listing on the Nature Conservancy's website here: https://www.nature.org/en-us/getinvolved/how-to-help/places-we-protect/pine-hills/?tab_q=tab_container-tab_element

in 1943 (Natural Bloomington, 2019). The area was a prized possession of the citizens of Paoli, Indiana who laboriously fundraised to buy Cox Woods back from the lumber company to the tune of $24,300.[24] The initiative to repurchase Cox Woods garnered the support of the United State Fish and Wildlife Service because it is "virgin" forest, meaning it has been untouched by human development or resource-use. Since the citizen's purchasing of Cox Woods, the Forest Service has managed and protected it along with a 165-acre buffer; which now sits in the middle of the Hoosier National Forest (Natural Bloomington, 2019).

The same kind of grassroots effort to protect Indiana's lands was seen in the Save the Shades campaign organized by local communities in southern Indiana to purchase a historic and popular recreation site back from a holding company who bought the land in 1947 (Indiana, 1947). Once purchased, this land — referred to as Shades — was then donated to the Department of Conservation and became Shades State Park (Indiana DNR, 2019b). These valiant efforts of local communities and private organizations to save wild lands for future use by the Hoosiers demonstrates the power of the personal connection experienced by rural agricultural communities and private land holders to their land. However, this unique cooperation lessened with the 1967 passage of Nature Preserves Act, which authorized the use of state funding for land acquisition by the Department of Conservation (and now Department of Natural Resources as of 1965) (Indiana Department of Natural Resources, 2019b). The cooperative and inclusive efforts of conservation and land acquisition in the earlier years of the DNR (or DOC) embodied the community-approach to conservation necessary to form a sustainable society that will grow

[24] The value the people of Paoli, IN paid for the purchase of Cox Woods, $24,300, is equivalent to $361,240.35 in 2019. This value was calculated using an inflation calculator from: https://www.saving.org/inflation/inflation.php?amount=300&year=1943

in ways that promote the coexistence of humans and the environment, even as urban development increases.

To foster continued community involvement in Indiana's conservation effort, the Department of Natural Resources (DNR) began to implement more formal education programs into their public outreach efforts in the mid to late twentieth century. This coincided with the urbanization of the public and the demands for political transparency in a post-Vietnam society. To encourage public understanding of DNR policies and to increase safety practices, the DNR began a hunter safety course (now referred to as hunter's education), which was required as of 1987 (Indiana DNR, 2019h). Later boating safety education and trapper's education were added to the DNR's offered safety courses. To aid in the growing disparity between the purpose of conservation efforts between rural and urban communities, the DNR began to incorporate programs to educate urban populations on conservation and increase community involvement in these efforts. In 1985, Project Learning Tree and its Outdoor Lab were created by the DNR to help teachers create forestry-related lessons for the classroom (Indiana DNR, 2019a). In 1990, legislation was passed to allow the DNR Division of Forestry to provide a tree seedling to every third grader in Indiana. That same year, the Community and Urban Forestry Program began to keep citizens involved in the maintenance of Indiana's forests. One of the few urban state parks, Benjamin Harrison State Park, opened its Natural Resources Education Center in 2001 — creating the first urban outreach center of DNR for the purpose of environmental interpretation (Indiana DNR, 2019b).

Environmental Interpretation and Environmental Education Defined

Environmental interpretation has its roots in the role of the "nature guide" developed by

Enos Mills in the early 1900s at Long's Peak Inn's Trail School. A nature guide, as defined by Enos Mills, is "a naturalist who can guide others to the secrets of nature (Mills, 1920)." Mills emphasizes the exploration of nature on the part of the learner with the guidance role of the nature guide, also interchangeably referred to as the "guide-interpreter," who convey big principles, offers recreation, tells biographies of living things through their life stories, and evokes intellectual visions (Mills, 1920). The purpose of the nature guide is to allow the individual's exploration of nature to bring the wilderness to life, removing the traditional academic manner of conveying isolated information, facts, classifications, rules, theories, and manuals. Enos Mills' description of the nature guide/naturalist/guide-interpreter is closely related to the beginning of the naturalist service in the United States National Parks, as his ranch eventually became a key component of Rocky Mountain National Park and has influenced the function of naturalist services in State Parks (Brunelli, 2013). From the its beginnings in the work of Enos Mills, the definition of environmental interpretation has been refined. The official definition of environmental interpretation for the National Parks Service is stated in Freeman Tilden's *Interpreting Our Heritage,* which was written per the request of the National Park Service and published in 1957, as: "An educational activity which aims to reveal meanings and relationships through the use of original objects, by firsthand experience, and by illustrative media, rather than simply to communicate factual information (Tilden, 1957)."

Like environmental interpretation, environmental education began with the work of one individual. Liberty Hyde Bailey's Nature Study Idea arose from the pushback to the education system in the late 1800s and early 1900s during the American Education Reform Movement. In his book *The Nature Study Idea,* Bailey breaks out of the formal model for education by introducing the idea of "nature study," which involves the education of young (elementary-age)

school children of the natural world around them through experience and exploration. The nature study idea emphasizes learning driven by observation and investigation on the behalf of each student with the teacher offering answers when appropriate while leading the student to their own conclusions through progressive inquiry (Bailey,1920). Bailey provides an outline for nature study as a three-step process of inquiry: the fact, the reason for the fact, and the interrogation of the fact left in the mind of the pupil (Bailey, 1920). While Bailey's ideas did focus on the informality and individualization of the learning experience, he did specify that formal academic training in the sciences was appropriate for high school and college-age students who have a level of specialization in the study of sciences (Bailey,1920). The goals of Bailey's nature study idea did not catch momentum on a national level but was experimented with and can still be seen in various preschool nature-exploration programs. However, the overarching theme of participatory learning of the nature study idea can be found in more contemporary definitions of environmental education.

Based on a collection of short definitions of environmental education released nationwide by institutions of higher education, "environmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution (Stapp et al., 1969)." Likewise, in the United Nations Conference on the Environment and Development and the deliberations from the United Nations Educational, Scientific and Cultural Organization's (UNESCO) Tbsili Intergovernmental Conference in 1978, the guiding principles, objectives, and goals of environmental education was determined to include awareness, knowledge, skills, affect, and participation (UNESCO, 1977; UNESCO, 1992). The objectives of

environmental education as outlined by the Tsbili Conference outlines the framework for cultivating environmental literacy in environmental education program participants (McBeth and Volk, 2010). These overarching themes show some connection to Liberty Hyde Bailey's objectives of participatory learning and problem-solving in the nature study idea. Today, these goals are included in most environmental education and interpretation programs in the United States in National and State Parks, museums, and schools.

Looking at the work of Bailey, Tilden, and Mills, the fundamental similarities of environmental interpretation and education can be seen amid the differences. Both environmental interpretation and education focus on the development of an understanding of nature in pupils, directing them towards developing environmental literacy as citizens of their communities. At their root, both aim to aid the learner in exploring the natural world, but environmental education has taken the form of more academic, traditional systematic learning through the sciences rather than through experience, as environmental interpretation does. For successful environmental education and interpretation, incorporating the objectives defined by the 1978 Tbsili conference of awareness, knowledge, skills, affect, and participation requires an adequate balance of both scientifically-based environmental education and experiential learning. Successful programs promote environmental literacy through the growth of citizens' knowledge on environmental topics with the coinciding personal connections and experiences with nature that provide motivation to act. Only then will sustainability and environmental literacy be attainable on the part of individuals and as a community, especially as the United States population becomes more urban.

A recent focus of environmentally-oriented discussions in the past two decades has been "sustainable development" — a subject that has become more relevant as the number of urban

environments and populations increase. Sustainable development involves the linking of programs for the economic development with the state of the natural environment (Hernandez and Mayur, 1999). The UNESCO's Tbsili outline of environmental education for environmental literacy leads into a long-term destination of sustainable development of communities and nations as urban environments continue to expand (McBeth and Volk, 2010). This objective, of environmentally conscious and responsible citizens and communities, has been a driving force for environmental interpretative and educative movements since their advent. In the wake of the Industrial Revolution in Europe and a sudden growth in urban environments, the focus of Rousseau, Patrick Gedes, and Frederic LePlay was the reconnection of society with nature (Martin, 1975). The philosophy of the beginnings of environmental education was based on exposure to the natural world, primarily through children, with the aim of developing individual connections with nature.[25] Likewise, the end of the American Frontier, coinciding with the construction of the Central Pacific Railroad, in the 1860s and the rampant exploitation of natural resources by Americans aligned the work of Liberty Hyde Baily, Enos Mills, and John Muir with the growing need in the United States for a connection to nature. This goal, like that of European forerunners, began with exposing children to nature and slowing them to develop a connection to it. This aim has served as the driving force for environmental interpretation and education in the United States and Indiana from its conception to the present, followed by the waves of conservation movements,[26] which have also coincided with explosive urban population growth in

[25] Refer to Section 1: The History of Environmental Interpretation from Europe to the United States.

[26] In US History, there have been two main waves of conservation in terms of policy and propaganda: the first coming after the turn of the nineteenth century with the work of President Theodore Roosevelt and the establishment of National Parks. Another sub-point to the first wave came after the Dust Bowl and the massive crop failures which coincided with the Great Depression in the 1930s. From this came a wave of legislation focused on soil and water

the twentieth century (Ritchie and Roser, 2019). [27] The first wave of conservation in the United States peaked with President Theodore Roosevelt's establishment of the National Parks and the work of John Muir and Enos Mills in the early nineteenth century (Sparling, 2014). In Indiana, this first conservationist movement can be seen in the work of Richard Leiber's work in the newly established Department of Conservation with state parks from 1917 to 1933 (Jackson, 1997). His efforts included the1927 establishment of the first "nature guides" or naturalists in Indiana State Parks.

The naturalists in both the National Parks and Indiana's State Parks operate using the same philosophies of practice found in the writings of Enos Mills— whose work established nature guiding we now consider unique to interpretative naturalist services. This common basis found in the naturalist programs of National Parks and Indiana's State parks is reflected in the current definitions and objectives for their respective interpretative programming. The National Park Service defines interpretation as two part as a successful catalyst in creating an opportunity for the audience to form connections with the significance inherently in the resource and as appropriate for the audience— providing clear focus for the development of a connection with resources presented through relevant idea(s) rather than a series of facts (Smaldone, 2003). The Indiana Department of Natural Resources has defined successful natural interpretation as creating a bridge between people and Indiana's natural resource by enhancing understanding, awareness, and appreciation of nature and encouraging the development of positive personal

---

conservation in response to the losses suffered from over-use of resources. The second wave of conservation came in the 1960s and 70s beginning with Rachel Carson's *Silent Spring*, along with other journalistic pieces, and coincided with the passage of pro-environment legislation such as the National Environmental Policy Act (1964) and the Endangered Species Act (1973) (Sparling, 2014).

[27] For more information on urbanization trends in the United States see Appendix A. See also https://ourworldindata.org/urbanization

connections with nature on the part of the participant (Indiana Department of Natural Resources, 2003).[28]

As previously mentioned, environmental education and interpretation hold the same basic concept of instilling an understanding of the natural world in the participant with the aim of developing environmental literacy for their contribution toward a sustainable society. But after this common core, the two subjects diverge. Environmental interpretation has historically been and remains in the settings like those of the National and State Parks, while environmental education lies in education systems and other traditionally more structured settings. The practice of both environmental interpretation and education in Indiana is fundamental in our progress in conservation and developing environmentally-literate citizens.

Environmental Interpretation and Education in Indiana

Both environmental interpretation and education in Indiana share a root in the work of individual nature enthusiasts focused on protecting the natural environment of Indiana and educating others about it. These individuals, previously discussed, include Gene Stratton-Porter, Edwin Way Teale, Charles C. Deam, President Benjamin Harrison, Winona H. Welch, Richard Leiber, and contemporary artist William "Bill" Zimmerman (who will be discussed in the following section). The spirit of these individuals' environmental interpretative efforts, most notably Colonel Richard Leiber who laid the framework for our current state park system, is most visible in the naturalists and interpretative programming at Indiana's state parks (Indiana DNR, 2019b). The implementation of naturalists in Indiana's state parks began in 1927 with just

[28] For the full map of environmental interpretation formulated by Indiana's DNR, see Appendix A.

four parks and has since grown to include interpretative naturalists in most state parks and fish and wildlife areas today.[29] The mission of the Department of Natural Resources (DNR) Interpretative Services is to "provide information and offer interpretative experiences with Indiana's natural and cultural resources to visitors, staff and a diverse public (Indiana DNR, 2019b)."

This mission statement has directed the implementation of audiovisual technologies into natural interpretative displays and currently directs the creation of interpretative programming in Indiana's DNR. One of these curriculums includes DNR's Healthy Parks Healthy People initiative and the Patch Program for all ages. These programs are designed to involve the community, through families, in learning about the environment through hiking, camping, and volunteering in state parks (Indiana DNR, 2019a; 2019d). The sentiments cultivated by the Patch Program and the Healthy Parks Healthy People program are also reflected, in a more direct manner, in DNR's Children's Outdoor Bill of Rights. This Bill of Rights serves to promote family health and wellness and increase overall quality of life in Hoosiers by advocating the involvement of youth in outdoor recreational opportunities, while being motivated by parents to discover the abundant natural resources and recreational opportunities available in Indiana (Indiana DNR, 2019d). This is done by presenting, on DNR's website, a checklist for parents to complete with their children with the objective of rewarding them with a "Hoosier Outdoor Child certificate." This checklist of 11 requirements includes exploring and playing outdoors, following a trail and discovering native plants, wildlife, and history, and climbing a tree (Indiana

[29] In total there are 25 natural interpretative centers in Indiana today. To view a map of the centers visit, https://www.in.gov/dnr/parklake/2416.htm.

DNR, 2019d). These same objectives have been used to integrate environmental interpretation into urban environments to close the gap between an increasingly urban population and nature.

Online and on-air efforts by DNR has broadened the access of the public to interpretative services through the *Indiana Outdoors* Radio and TV Show, as well as the DNR YouTube channel that includes content on the natural and historical content of our State parks, preserves, and fish and wildlife areas (iDNR YouTube, 2019). [30] To get more people involved in fishing and angling, Go FishIN is a program that educates participants on the art of fishing and aids them in the process of obtaining a fishing license, catching and cleaning a fish, and identifying native fish species found at Indiana's State Parks and Reservoirs. Go FishIN includes an urban contingent — Go FishIN in the City offers opportunities for the public to fish in the city with the partnership of local parks and fish stocking organizations (Indiana DNR, 2019i). This partnership stocks local ponds with channel catfish and rainbow trout, making fishing spots open to the public in Evansville, New Albany, Terre Haute, Indianapolis, Avon, Carmel, Lafayette, Fort Wayne, and Hobart. Events hosted by DNR at these urban fishing holes, and the content offered on DNR's website, walk urban dwellers in the fishing process and host in-person workshops at urban fishing spots to help Hoosiers improve their fishing and angling skills (Indiana DNR, 2019i).

These programs, online, on the air, and in state parks and urban areas, function to educate Hoosiers on the natural environment to promote environmental interest and environmental literacy in Hoosiers. These two objectives, while not explicitly stated by DNR in their mission of Interpretative Services, is implied through the presence of the four main objectives of

[30] To see more on the Indiana DNR YouTube channel, visit their page here https://www.youtube.com/user/idnrvideos.

environmental education/interpretation determined by the United Nations Educational, Scientific, and Cultural Organization's (UNESCO) Tbsili Intergovernmental Conference: the promotion of awareness, knowledge, skills, and participation (UNESCO, 1978). Indiana's Department of Natural Resources (DNR) Interpretative Services also lays the frameworks for environmental literacy in Hoosiers by meeting the four Tbsili objectives in their interpretative programming.

The same core elements seen in Indiana's efforts at environmental interpretation can be seen in the programs that form environmental education in Indiana. Environmental education is based on a set of objectives, is usually seen in the context of a "curriculum," and is much less free-lance and more structured and information-heavy than environmental interpretation. Environmental education did not become a common or even well-developed practice in Indiana until the latter half of the twentieth century. Indiana DNR offers a variety of environmental educational programs. The more commonplace of these programs is hunter and trapper education classes, begun in 1987, that are required for the successful application for a hunting or trapping license in the state of Indiana (Indiana DNR, 2019h). These classes, along with boating safety courses, are taken by a wide range of the public in comparison to other, more focused programs ran by DNR such as the Indiana Master Naturalist program. Like hunter education, trapper education, and boating safety courses offered by the DNR, the Indiana Master Naturalist Course encourages the development of natural and biological knowledge among interested members of the public while promoting volunteerism in State Parks (Indiana DNR, 2019c). Master Naturalist programs are more focused on audience-type than hunters' education or boating safety, as the participants must be prepared to apply themselves to learning native fauna and flora in a more classic academic style. In the Master Naturalist course, participants are taught how to identify plants and wildlife and then must pass a field "quiz" in order to become a certified Indiana

Master Naturalist (Indiana DNR), 2019c). By completing this course, Indiana Master Naturalists can volunteer to help run interpretative programming and events in State Parks.

The use of state parks' interpretative services personnel and facilities for school and group programming has been a traditional facet to the face of environmental education in Indiana but has recently become more frequent with the adoption of Environmental Science Standards by the Indiana Department of Education (IN-DOE), which has increased the number of field trips and invited presentations by schools and other groups to state parks. Aside from state parks, the adoption of IN-DOE standards in environmental science has also promoted outings to the Indiana State Museum, field trips to universities' biological sites, and invited speakers who are related to the field of conservation. The environmental science standards of the IN-DOE include curriculum coverage of topics such as ecosystems and human's role, biological cycles, human impact, renewable and nonrenewable energy, and more (Indiana Department of Education, 2018). The extensive list of environmentally focused topics required for school curricula is spread across some elementary schools' class and many middle and high school science courses.

The function of the IN-DOE Environmental Science standards is to educate youth on biological concepts in order to promote environmental literacy. The focus on youth is common among environmental interpretation and education because of the ability of youth to carry on environmental literacy to future generations, but also because youth can pull older generations into interpretative programming and sustainable practices through their own interests.

Historically, in the origins of environmental interpretation and currently, youth have always been a target and focus for interpretative services. The Indiana Department of Natural Resources not only comes along side schools in environmental education by offering curriculum-oriented programs, but also mediates other programs that build on IN-DOE standards to promote

a wider exploration of nature on the part of students. Project WILD is a nation-wide program for conservation and environmental education for kindergarteners through high-school, based on the idea that young people and educators have an interest in learning about our natural world. Its objective is stated by Project WILD as follows: "Emphasizing wildlife because of its intrinsic value, Project WILD addresses the need for human beings to develop as responsible citizens of our planet (Indiana DNR, 2019a)." Through completion of a Project WILD workshop, educators can become certified to teach project WILD in Indiana. Such workshops and curriculum assistance are sponsored through the Indiana DNR (Indiana DNR, 2019a).

Project Learning Tree is another nationwide program used by state agencies to aid educators in involving youth in an exploration of our natural resources. This program operates through the Indiana DNR's Division of Forestry's Indiana Project Learning Tree Coordinator. The focus of Project Learning Tree is to "engage elementary and middle school students in science, technology, engineering, and math as they learn about history, tradition, and storytelling (Project Learning Tree, 2019; see also Indiana DNR, 2019a)." Unlike the IN-DOE curriculum, which advocates for a more formal approach to teaching environmental topics, Project Learning Tree and Project WILD function to inform students through exploration and hands-on activities. This method, somewhat like interpretative services, functions to create a personal interest in the student concerning nature so that a seed of personal investment in the environment is formed, with the goal of them blooming into an environmentally literate citizen.[31]

Aside from the efforts of environmental education on the part of the Indiana Department of Natural Resources, the Indiana Department of Environmental Management (IDEM) also

[31] To learn more about environmental education events and programs in Indiana visit the DNR's website: https://www.in.gov/dnr/fishwild/7543.htm

comes alongside IN-DOE curricula and educators to bring environmental education of schools as well as other community organizations. IDEM publishes the *IDEM Environmental Education Bulletin for Educators* twice a year to promote environmental education events and classroom opportunities, such as interactive learning experiences and crafts, that promote backyard conservation (Indiana Department of Environmental Management, 2019c). IDEM not only assists in the initiative to incorporate environmental education into schools but actively works in local communities to involve them in monitoring local water quality through Hoosier Riverwatch. Hoosier Riverwatch educated Hoosiers on the science of water quality and its importance and then equips them to actively work to monitor the water quality of local streams and rivers (IDEM, 2019b).

The goal of the United Nations Educational, Scientific, and Cultural Organization's objectives in environmental education/interpretation is to promote environmental literacy in the audience (UNESCO, 1978). This entails action on the part of individuals effected by the interpretative or educative programming in support of conservation and sustainability. Citizen science (engaging nonprofessionals in research, such as the previously mentioned Hoosier Riverwatch program) is critical to environmental literacy and strengthens community engagement in earth stewardship (Merenlender, 2016). In the history of Indiana's environmental interpretative and educational programs, individual citizens working for conservation in the roles of free-lancing artists, writers, or volunteers is a prime example of the involvement which is the end goal of educative or interpretative endeavors. Most of these people mentioned in modern history were motivated by their own personal connections with nature and were not motivated primarily by interpretative services or organized environmental education. However, their roles in the conservation story of Indiana can serve as a point of reference for the type of learning

environment necessary for the formation of the real-life connections with nature needed to build environmental literacy in Indiana.

A contemporary example of the unique connections between citizens and professionals working for conservation can be seen in William "Bill" Zimmerman (1937-2011), a self-made artist of birds based in Nashville, Indiana (Brown County Art Gallery, 2019). All of Bill's paintings benefited conservation, as the profits went to local conservation efforts. Bill's artwork can be seen on Oliver Winery bottles and t-shirts sold in Nashville, Indiana shops.[32] He also contributed to the bank of scientific knowledge through his illustration of books including *The Birds of Indiana*, *Waterfowl of North America*, and the woodpecker volume of *The Life Histories of North American Birds* (Brown, 2019).[33] Later in Bill's career, he made some paintings to decorate a portion of the Brown County State Park's Nature Center and helped design the layout of the space (Wood, 2012). In a radio interview of a veteran naturalist at Brown County State Park, who was personally acquainted with Bill through his work at the Park, Bill was described of regularly aiding naturalist interpretative programming and even hosting meetings with naturalists to improve their interpretative abilities so that nature would come alive to the audience (Wood, 2012). Though the naturalist could not be inside of Bill's thoughts, he mentioned Bill described nature to others as he saw it — in vivid detail — which reveals a passion about Bill's work independently and in conjunction with professionals for conservation and the promotion of nature to the public (Wood, 2012). Bill, like other citizen-naturalists before

[32] To explore Bill's artwork visit http://www.browncountyartgallery.org/historic-collections/wmzimmerman-collection or https://www.invaluable.com/artist/zimmerman-william-haroldq42au7s8qg/sold-at-auction-prices/

[33] *The Life Histories of North American Birds* is a series of books by Arthur Cleveland Bent. The woodpecker volume of this series, also titled *The Life History of North American Woodpeckers* contains original paintings by William Zimmerman. The dimensions of the woodpecker volume are larger, more like a coffee-table book, with dimensions of 1.1" x 8.5" x 10.8".

and after him, had a personal connection to nature. This connection drives citizens to go out of their way to work for and support conservation.

The work of environmental interpretation and education done by environmentally literate members of the public helps encourage the engagement of communities with nature — something that professionals alone cannot be able to accomplish. The role of citizen involvement in fund-raising for state lands and the promotion of conservation historically and currently in Indiana is vital, as it exemplifies the commitment and involvement desired in an environmentally literate citizen. The few who are actively engaged in conservation model environmental literacy to their communities, a role that is particularly important in urban environments where contact with nature is lower than rural environments. This is a role that professionals cannot play, as they are set apart from the community as a representative of the DNR. Additionally, the manpower needed to successfully administer environmental interpretation and education to Hoosiers cannot come from DNR alone. It is up to citizen science and volunteer naturalists to further the objectives of environmental interpretation and education for the development of a sustainable society.

One of the ways environmentally literate citizens can participate in conservation in Indiana is through citizen science. As described by citizenscience.gov, citizen science is used to engage the public in addressing societal needs to accelerate science, technology, and innovation (United States General Services Administration, 2019). The public participates in citizen science, specifically in biology-based research, by collecting and analyzing data or even conducting experiments. Citizen science can be the work of a small focus group, or through crowdsourcing, which is the more common method. Crowd sourcing is done by an individual scientist or scientific organization submitting an open invitation for the public's voluntary input on research

(United States General Services Administration, 2019). A worldwide example of this can be seen in Cornell Lab of Ornithology's eBird application[34] that allows birders around the world to input species and location information on the birds they have seen. This essentially serves as index data on the species and relative quantities of birds across the United States and elsewhere (The Cornell Lab of Ornithology, 2018). Citizen science is also small scale and local. An example of this is the Audubon Society's Christmas Bird Count, a visual survey annually conducted by volunteers (Indiana Audubon Society, 2019).

Outside of citizen science, the public can practice and promote environmental literacy through aiding educational and interpretative events. One such program at the Indianapolis Zoo allows for volunteers to run educational stations on certain animals or concepts that are scattered throughout the zoo (Indianapolis Zoo, 2018). In Indiana, volunteers at state parks can help run certain interpretative and educational events as well as contribute to the maintenance of the park's trails and other amenities if interested. Organized promotion of natural interpretation is seen in the work of the Indiana Chapter of the Audubon Society, who offers guided birding outings for groups and individuals, which are most popular at the Indiana Dunes, Mary Gray Bird Sanctuary, Goose Pond Fish and Wildlife Area, and within the Indianapolis Area (Indiana Audubon Society, 2019b). Overall, the work of environmentally literate citizens forms the backbone of environmental interpretation and education in Indiana and promotes environmental

[34]The eBird application is a product of the Cornell Lab of Ornithology in partnership with the Audubon Society, the National Science Foundation, and the Leon Levy Foundation. More information on eBird and other citizen science initiative through the Cornell Lab can be found here: http://www.birds.cornell.edu/citizenscience/ and https://ebird.org/home?__hstc=161696355.5c6a743042724aeb1c34163359bc1447.1549232597770.1549232597770.1554322605450.2&__hssc=161696355.1.1554322605450&__hsfp=512083986#_ga=2.126597572.873366704.1554322604-1003461769.1549232595

literacy on a community-level. As Indiana becomes more urban, it is the work of volunteers that will be needed to propel us into a sustainable future.

Conclusion

The use of environmental interpretation and education to combat disconnection to nature resulting from urbanization is seen in the work of Thoreau, Geddes, and LePlay in Europe as well as the work of John Muir, Liberty-Hyde Bailey, and Enos Mills in the United States. The resource overuse resulting from agriculture and urbanization in both the United States[35] and Indiana drove the beginnings of conservation in our state. In these conservation efforts lies the roots of environmental interpretation and education in Indiana. Professional approaches in Indiana to environmental interpretation and education grew from the voluntary efforts of Hoosiers and it is the work of volunteers that will continue to forge the connection between the average Hoosier and nature as urban populations grow. In this effort to aid conservation and communicate to Hoosiers the value of nature, environmental interpretation and education is key to an environmentally literate and sustainable Indiana.

[35] Between 2000 and 2015, the Mid-West has had the largest drop in rural populations and the largest increase in small metro or suburban populations with 68% of rural counties having lost population and 85% of rural midwestern counties having lost more population than has moved in. In Indiana, our urban populations have increased from 70.8% of Indiana's total population in 2000 to 72.4% in 2010.

References

Bailey, L.H. (1920). The Nature Study idea: An Interpretation of the new school-movement to put the young in relation and sympathy with nature [print]. New York, NY; The Macmillan Company.

Brunelli, M. (2013). From nature guiding to nature interpretation in the United States (18721920). The origins of the professional practice of heritage interpretation: between protection and education. History of Education & Children's Literature, 7:1, pp. 399-428.

Dray, P. (2018). How This Photo of Theodore Roosevelt in Hunting Gear Helped Jump-Start the American Conservation Movement [Online Article]. Retrieved from: http://time.com/5259995/theodore-roosevelt-portrait-conservation-hunting/

Duignan, B. and M. Cranston. (2018). Jean-Jacques Rousseau: Swiss-born French Philosopher. Retrieved from: https://www.britannica.com/biography/Jean-Jacques-Rousseau

Environmental Protection Agency (1990). The National Environmental Education Act [online webpage]. Retrieved from: https://www.epa.gov/education/national-environmentaleducation-act

Higgs, H. 1890. Frédéric Le Play [online]. The Quarterly Journal of Economics, 4:4, pp. 408-433. DOI: 10.2307/1881745

iDNR (2019). Indiana Department of Natural Resources [YouTube channel]. Retrieved from https://www.youtube.com/user/idnrvideos

Indiana Academy of Science (2019). History [online webpage]. Retrieved from https://www.indianaacademyofscience.org/the-academy/history .

Indiana Audubon Society (2019a). Audubon Christmas Bird Counts [online event description]. Retrieved from https://indianaaudubon.org/event/audubon-christmas-bird-counts/

Indiana Audubon Society (2019b). Bird Guiding [online webpage]. Retrieved from https://indianaaudubon.org/events-page/outreach-and-education/bird-guiding/

Indiana Department of Education (2018). Environmental Science Resources [online webpage]. Retrieved from https://www.doe.in.gov/standards/environmental-science-resources

Indiana Department of Environmental Management (2019a). Wetlands, Lakes and Stream Regulation [online webpage]. Retrieved from https://www.in.gov/idem/wetlands/

Indiana Department of Environmental Management. (2019b). Hoosier Riverwatch [online webpage]. Retrieved from https://www.in.gov/idem/riverwatch/2337.htm

Indiana Department of Environmental Management (2019c). Environmental Education Home [online webpage]. Retrieved from https://www.in.gov/idem/iee/

Indiana Department of Natural Resources (2003). What is an Interpretative Naturalist? [online diagram]. Retrieved from https://www.in.gov/dnr/parklake/files/WhatisanInterpreter2003.pdf

Indiana Department of Natural Resources (2019a). Interpretation and Education [online webpage]. Retrieved from https://www.in.gov/dnr/parklake/2389.htm

Indiana Department of Natural Resources (2019b). DNR History [online webpage]. Retrieved from https://www.in.gov/dnr/3245.htm

Indiana Department of Natural Resources (2019c). Indiana Master Naturalist Program [online webpage]. Retrieved from https://www.in.gov/dnr/parklake/6321.htm

Indiana Department of Natural Resources (2019d). Patch Programs [online webpage]. Retrieved from https://www.in.gov/dnr/parklake/2418.htm

Indiana Department of Natural Resources (2019e). School and Group Programs from Indiana State Parks [online webpage]. Retrieved from https://www.in.gov/dnr/parklake/2419.htm

Indiana Department of Natural Resources (2019f). Interpretative Center Locations [online webpage]. Retrieved from https://www.in.gov/dnr/parklake/2416.htm

Indiana Department of Natural Resources (2019g). For Kids: Explore Your Environment! [online webpage]. Retrieved from https://www.in.gov/dnr/kids/index.htm

Indiana Department of Natural Resources (2019h). Indiana Fish and Wildlife Online License Registration System [online webpage]. Retrieved from https://www.in.gov/dnr/fishwild/9339.htm

Indiana Department of Natural Resources (2019i). Go FishIN [online webpage]. Retrieved from https://www.in.gov/dnr/fishwild/7545.htm

Indianapolis Zoo (2018). Volunteer Opportunities at the Zoo [online webpage]. Retrieved from https://www.indianapoliszoo.com/jobs-volunteer/volunteers/

Iowa Community Indicators Program. (2019). Urban Percentage of the Population for States, Historical [Online Table]. Retrieved from https://www.icip.iastate.edu/tables/population/urban-pct-states

Jackson, M. T. 1997. The Natural Heritage of Indiana. Bloomington, IN. Indiana University Press.

Mackintosh, B (1986). Interpretation in the National Park Service: a historical perspective [print]. Washington, D.C, History Division of the National Park Service, Department of the Interior.

Martin, G. and K. Wheeler (1975). Insights Into Environmental Education [print]. Edinburgh, Scotland; Oliver and Boyd.

McClelland, S (2002). Beyond Theory: Applying Environmental Interpretation in the U.S. National Parks [online]. Nonpublished Master Thesis. The Evergreen State College. Retrieved from http://archives.evergreen.edu/masterstheses/Accession86-10MES/McClelland_SJMESThesis2002.pdf

Merenlender, A. M., A. W. Crall, S. Drill, M. Prysby and H. Ballard. 2016. Evaluating environmental education, citizen science, and stewardship through naturalist programs [online]. Conservation Biology, 30:6, pp. 1255-1265. DOI: 10.1111/cobi.12737

Muir, J. (1996). John Muir His Life Letters and Other Writings [print]. Edited by Terry Gifford. Seattle, WA; Baton Wicks London the Mountaineers.

Natural Bloomington (2013). Pioneer Mothers, Donaldson's Woods, virgin forest in Indiana [blog post]. Retrieved from https://naturalbloomington.com/blog/2014/06/07/pioneermothers-donaldsons-woods-virgin-forest-indiana

Parker, K, J. M. Horowitz, A. Brown, R. Fry, D. Cohn and R. Igielnik. (2018). Demographic and economic trends in urban, suburban and rural communities [Online Article]. Retrieved from https://www.pewsocialtrends.org/2018/05/22/demographic-and-economic-trends-inurban-suburban-and-rural-communities/

Patrick Geddes [online encyclopedia]. (2018). Retrieved from: https://www.nls.uk/learningzone/politics-and-society/patrick-geddes

Ritchie, H. and M. Roser. (2019). Urbanization [Online Resource]. Retrieved from https://ourworldindata.org/urbanization

Smaldone, D. (2003). A Crash Course in Interpretation [Online Article]. Retrieved from https://www.nps.gov/grte/learn/management/upload/interp.pdf

Sparling, D. (2014). Natural Resource Administration: Wildlife, Fisheries, Forests and Parks [print]. San Diego, CA; Elsevier Inc.

Sullivan, F. E. and W. H. Schlesinger. (1972). The Environmental Education Act: Where Do We Stand Now? [online]. BioScience, 22:6, pp. 361-363. Retrieved from https://www.jstor.org/stable/1296342

The Cornell Lab of Ornithology (2018). eBird [online webpage]. Retrieved from https://ebird.org/home?__hstc=161696355.5c6a743042724aeb1c34163359bc1447.1549232597770.1549232597770.1554322605450.2&__hssc=161696355.1.1554322605450&__hsfp=512083986#_ga=2.126597572.873366704.1554322604-1003461769.1549232595

The Living New Deal (2019). Projects in Indiana [online database]. Retrieved from https://livingnewdeal.org/us/in/

The Nature Conservancy (2019). Pine Hills, Indiana [online webpage]. Retrieved from https://www.nature.org/en-us/get-involved/how-to-help/places-we-protect/pinehills/?tab_q=tab_container-tab_element

Tilden, Freeman. (1957). Interpreting Our Heritage. Chapel Hill, NC; The University of

North Carolina Press.

United Nations Educational, Scientific, and Cultural Organization (1978). The Tbilisi Declaration. Connect (UNESCO/UNEP Environmental Education Newsletter), 3(1), 1–8.

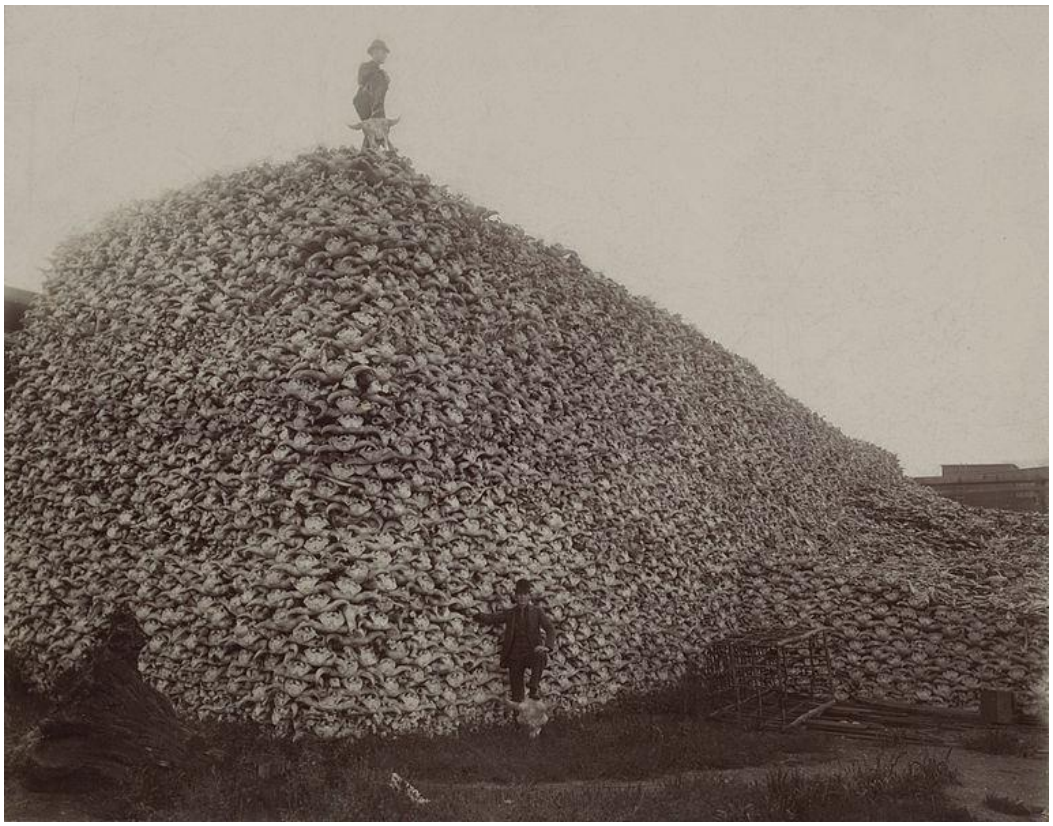
United States General Services Administration (2019). About CitizenScience.gov [online webpage]. Retrieved from https://www.citizenscience.gov/about/#

Wolf, L. M. (1945). Son of the Wilderness: The Life of John Muir [print]. New York, NY; Alford A Knopf.

Wood, D (2012, August). The Wildlife Art of William Zimmerman [online interview]. Retrieved from https://indianapublicmedia.org/artworks/12-32/

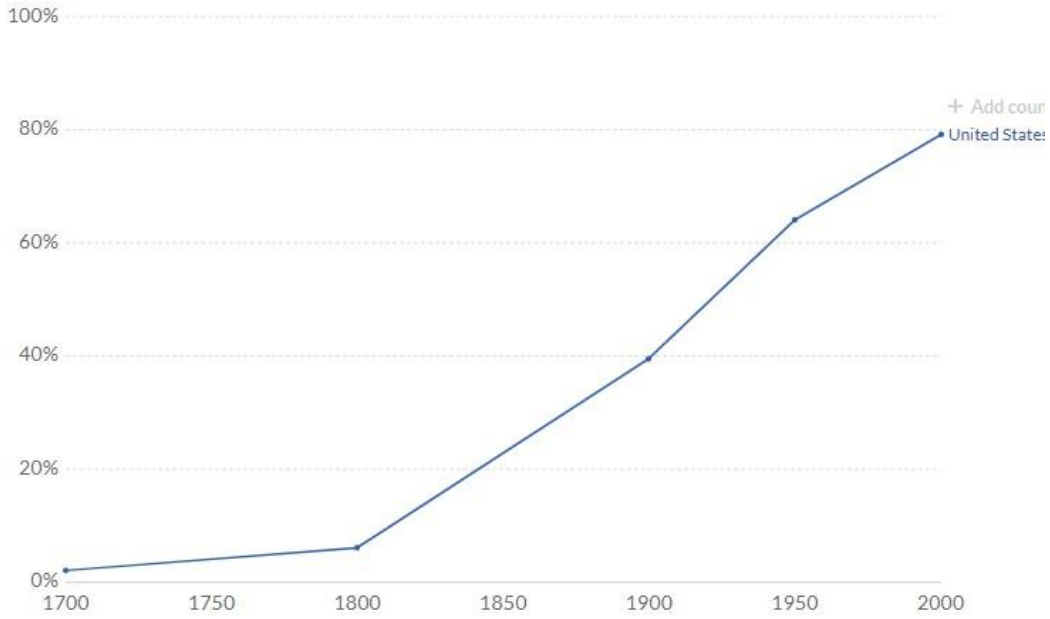
Appendix A: A Closer Look at Environmental Interpretation

1) The wanton use of natural resources by early United States citizens was fueled by various influences, as is demonstrated by the use of bison extermination to defeat Native Americans as seen below:



Source: Smithsonian Magazine, 'Where the buffalo no longer roamed.' https://www.smithsonianmag.com/history/where-the-buffalo-no-longer-roamed-3067904/

2) The urbanization of the United States' population from 1700-2000



Graph from: https://ourworldindata.org/urbanization

3) A diagram of the Indiana Department of Natural Resources' Interpretative Services:

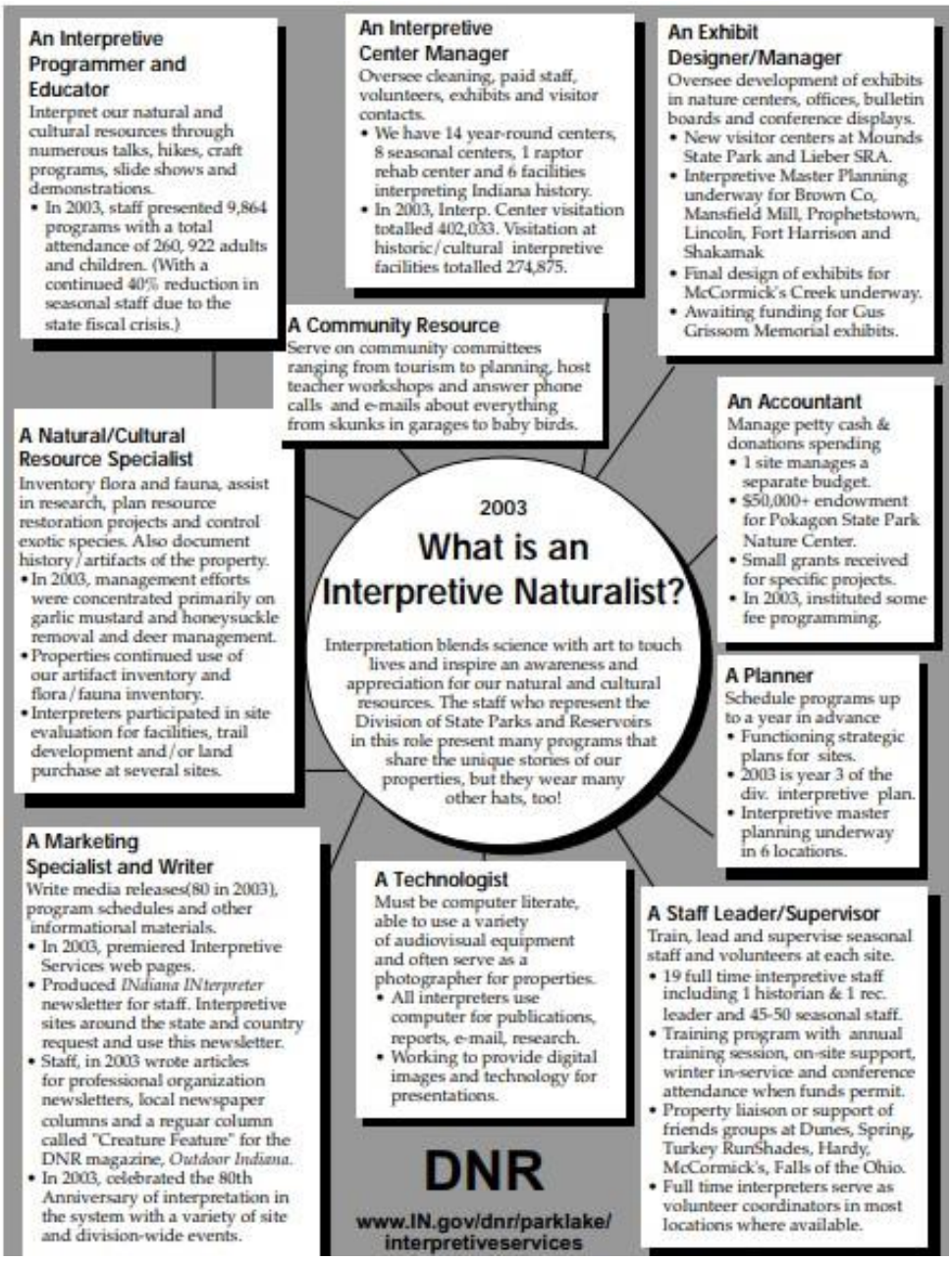


Diagram from: https://www.in.gov/dnr/parklake/files/WhatisanInterpreter2003.pdf

4) This is an image of Long's Peak Inn in the 1930s

Courtesy Estes Park Museum, 1990.006.00